
NPCA photo

Recent Crane Collapses Prompt Increase in Safety Concerns

What precast producers and erectors need to know.

By Sue McCraven

At 8:03 a.m. Monday, May 30, 2008, as Donald Leo rotated the horizontal arm of his high-rise construction crane, his operator cab and part of the crane's arm broke away from its steel-framed tower with a stomach-wrenching screech. Leo fell more than 200 feet to his death in a crumpled mass of steel at the foot of 91st Street and First Avenue in Manhattan's Upper East Side in New York City. Just 30 years old, Leo had plans to be married in one month's time. Another worker, a 27-year-old who was sending his earnings home to his family in Kosovo, was also killed in the accident, and a third construction worker, a 32-year-old, was seriously injured. Two months earlier, in March, seven people, including six construction workers, died when another tower crane collapsed during jacking operations near the 22nd level of a planned 43-story New York City townhouse.

Perhaps all safety-related stories should first reflect on the loss of human life to remind us that construction accidents often take the lives of relatively young workers; young people with hopes, plans and promising futures are lost. The second purpose of safety articles should be to present steps that can be taken to help prevent future accidents. In New York City, where more than 20 tower cranes may be in operation on any

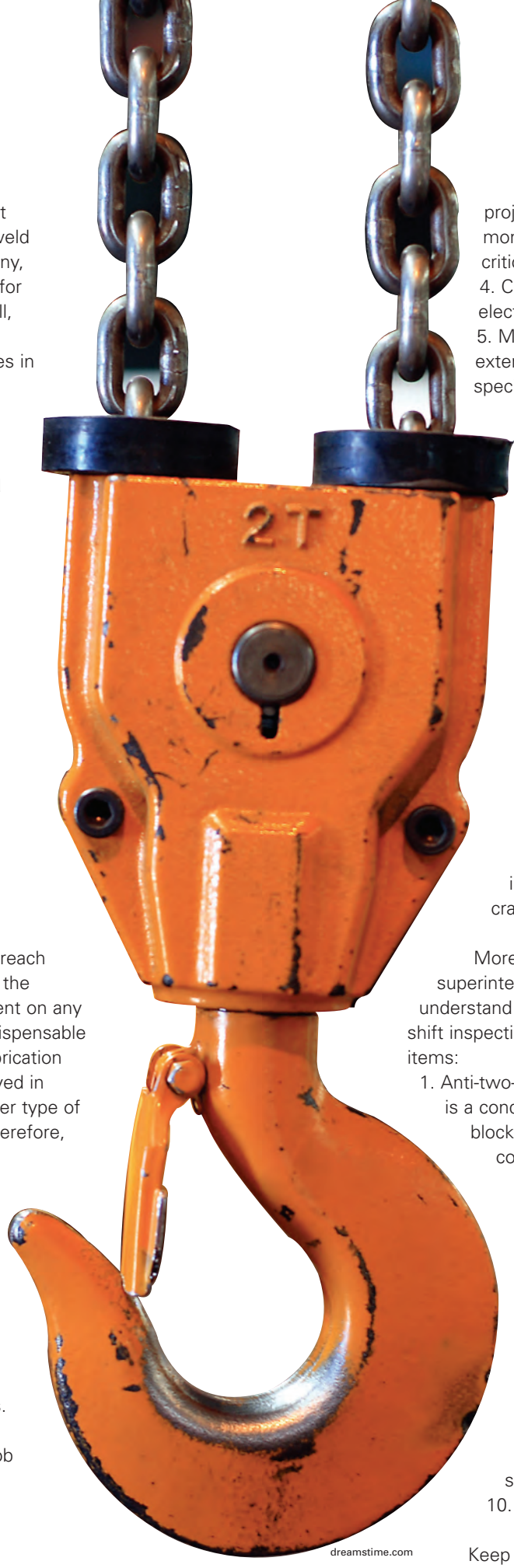
given day, investigations into the recent collapses have begun. So far, a failed weld on one crane's turntable is under scrutiny, and a city inspector has been arrested for taking bribes and falsely certifying small, mobile cranes for operation.

After the recent tower crane collapses in New York City and because cranes are responsible for more than 20 percent of all construction fatalities, here is an overview of the federal standards for crane, gantry and hoist safety enforced by the Occupational Safety and Health Administration (OSHA). In the precast concrete industry, tower cranes are often used in erection of parking structures and high-rise buildings on restricted sites. Large mobile cranes (track or wheel mounted) are frequently used to erect precast concrete structures such as mid-rise buildings and bridges, and gantry and mobile cranes are typically seen moving precast product at manufacturing facilities.

Responsibilities of site superintendent and crane operator

It is important to note that with advanced technologies, cranes have increased in strength, speed, capacity, reach and sophistication. Cranes are typically the most expensive piece of large equipment on any construction site and have become indispensable workhorses in the precast concrete fabrication and erection industry. Cranes are involved in more accidents, however, than any other type of construction equipment. It is critical, therefore, that site (or project) superintendents, senior management and crane operators have a thorough understanding and knowledge of crane capacity and limitations. While not meant to serve as a comprehensive list, here are 10 important points to remember:

1. Know and thoroughly understand the crane manufacturer's design parameters and operating guidelines.
2. The job site superintendent is responsible for all activities on the job site including crane operating conditions and safety.
3. Preplanning and coordination of all construction activities through to project completion, especially the monitoring of crane operations, are critical to job-site safety.
4. Check for overhead and electrical hazards.
5. Make sure outriggers are extended to manufacturer's specifications and ensure a solid crane foundation.
6. Check all clearances for lifting and access.
7. Check that pinch points are guarded and that congestion around the crane is minimized as much as possible.
8. Do not modify a crane's operating procedure or "make do" with existing equipment when faced with unexpected job-site events or conditions.
9. Ensure that the crane is suitable for the task and adequate for site conditions.
10. Remember that improper crane setup results in 50 percent of all construction crane accidents.



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More specifically, the site superintendent and crane operator must understand and be knowledgeable of pre-shift inspection protocols and these 10 items:

1. Anti-two-block devices ("two-blocking" is a condition in which the lower load block or hook assembly comes in contact with the upper load block or boom point sheave assembly)
2. Load-moment indicators
3. Mechanical level
4. Boom angle indicator
5. Load indicating devices
6. Crane load charts
7. Outriggers and pad supports
8. Radius measurements
9. Lifting devices, such as slings and bars
10. Load calculations

Keep in mind that all crane

"Because cranes have the ability to lift heavy loads to great heights, they also have an increased potential for catastrophic accidents if safe operating practices are not followed." — OSHA's Mobile Crane Inspection Guidelines

manufacturers' specifications and load charts were developed for ideal conditions and using new equipment and assuming, for example, no wind, a solid foundation, static or dead weight lifts, and no movement in the boom or swing angle. These are ideal conditions that are seldom found on construction sites. An experienced operator is expected to know when to reduce crane capacity and speed accordingly to suit existing conditions.

How often are crane inspections required?

Proper periodic recommended inspections by qualified crane inspectors will aid in identifying any mechanical or electrical crane components that are close to failure. According to OSHA, under 29 CFR (Code of Federal Regulations) Section 1926, a thorough crane inspection by a competent person (or by a government or private agency recognized by the U.S. Department of Labor) is required annually at a minimum, or more frequently as specified by OSHA regulations and relevant industry standards. Equipment owners must maintain a record of the inspection dates and results for every crane, gantry or hoist.

An increased frequency of crane inspections may be required depending on the activity (hours of operation) and the severity of conditions under which a given crane is operated. ANSI (American National Standards Institute) B30.2 determines service classes for cranes and inspection schedules based on equipment use. For example, hook, wire rope and chain conditions must be inspected monthly at a minimum.

New crane, gantry and hoist equipment must be load tested at 125 percent of the rated capacity before being placed in service or after major repairs to load-bearing components, and a certification of the load test must be kept on file. It is the responsibility of the employer or equipment owner to determine the frequency of inspections to comply with OSHA/ANSI regulations and to designate a competent or qualified person to perform inspections for hoisting equipment.

According to CMAA (Crane Manufacturers Association of America), a "qualified inspector" must have appropriate training and minimum specified field experience related to the maintenance, service, repair and functional testing of cranes. In addition to ensuring that equipment remains in good operating condition, regular inspections can minimize crane downtime and extend the service life of this expensive equipment. The important thing to remember is that should an accident involving a crane occur and records do not substantiate that proper inspection protocol was followed, equipment owners and employers may face costly legal liability for negligence. For more complete information on crane safety, regulations and inspection, visit www.mhia.org/industrygroups/osha.

How to ensure crane safety

According to OSHA's Fact Sheet No. 1, "Proper Inspection and Maintenance of Overhead Cranes and Hoists," proper equipment inspection can maximize operator safety. Equipment owners can help protect workers by taking these four steps:

1. Implement a crane, gantry and hoist inspection and maintenance program.
2. Train the crane and hoist operators to perform required pre-shift equipment inspection.
3. Train crane operators in proper use of equipment.
4. Make sure the operator knows and understands the manufacturer's operation manual.

Meanwhile, back in New York City …

According to recent press reports, of the 29 tower cranes that were operating at construction sites on March 15 at the time of the first 2008 crane accident in New York City, 21 cranes passed inspection and eight were immediately shut down until violations could be corrected. That works out to about a 30 percent inspection failure rate. Nine people lost their lives in the city's two crane collapses.

Four-hour inspections ordered by the city building commission for all tower cranes included checks of boom, load and swing functions as well as inspection of anti-two-block devices and boom hoist safety shut-offs. Two of the noncompliant tower cranes had paperwork violations, but six cranes presented serious safety violations including missing connection pins, broken mechanical parts and conditions not in accordance with the manufacturers' operation manuals. A city sweep of 220 mobile cranes followed.

Could anything have been done to prevent the crane collapses in New York City? Until the city's investigations are complete and engineering and forensic analyses of the tower cranes involved are available for review, we do not know. Complying with OSHA regulations and relevant industry standards for crane inspection protocols as well as ensuring that staff is properly trained in crane capacity and limitations are probably the most prudent steps to take to help maintain crane operating safety and prevent accidents. pi

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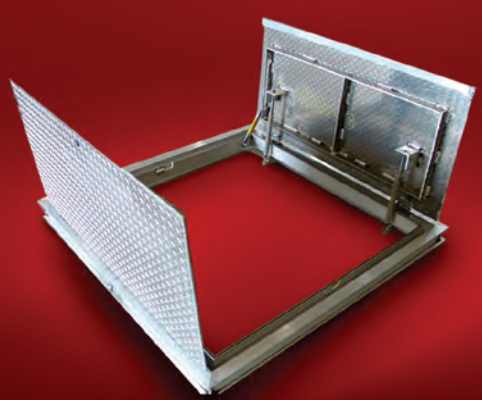

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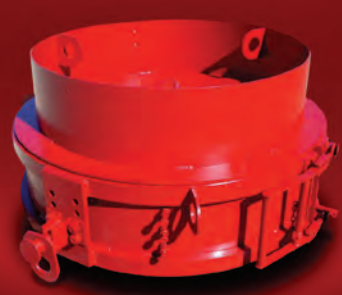

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